COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

TREE AND VINE NOTES

March 2009

University of California Cooperative Extension

38th Annual Tri-County Walnut Institute

Tuesday, March 17, 2009
Stanislaus County Ag Center
3800 Cornucopia Way
Corner of Service and Crows Landing Roads, Modesto
8:00 a.m. – 12:00 p.m.

7:30 **Registration & Refreshments**

8:00 **Codling Moth Mating Disruption Using "Puffers" & Other New Dispensers**
Joe Grant, Farm Advisor, UCCE San Joaquin County

New Developments in Walnut Husk Fly Management
Bob Van Steenwyk, Entomology Specialist, UC Berkeley

Update on Retain® and Hold® Trials
Kathy Kelley Anderson, Farm Advisor, UCCE Stanislaus County

California Walnut Marketing Board Annual Report
Dennis Balint, CEO/Executive Director, California Walnut Marketing Board &
Jennifer Getz, Assistant Marketing Director, California Walnut Marketing Board

Break

Walnut Rootstock Susceptibility to Crown Gall
Janine Hasey, Farm Advisor, UCCE Sutter & Yuba Counties

Management of Phytophthora Crown and Root Rot
David Doll, Farm Advisor, UCCE Merced County

Drought Management Strategies
Allan Fulton, Farm Advisor, UCCE Tehama County

Recent Advances in Walnut Blight Control
Jim Adaskaveg, Professor/Plant Pathologist, UC Riverside

12:00 **Adjourn**

2.5 continuing education credit hours pending

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Principles of irrigation efficiency for perennial crops

By: David Doll – Farm Advisor – UCCE Merced County

In order to make the best use of the available water this year, modification of orchard management practices to incorporate principles of water efficiency will be necessary. This involves understanding the conditions and limitations of the irrigation system and soil, how to calculate irrigation timings and amounts, and the adoption of practices that improve water penetration.

Use of Evapotranspiration Data. The amount of water that is lost daily to soil moisture evaporation and tree transpiration can be calculated using climate data and then multiplied by the crop coefficient to determine how much water is lost by the respective crop. The daily evapo-transpiration rates (ET_c) are then added up to determine how much water needs to be replaced through irrigation. Watering less than this amount will lead to a deficit, forcing the tree to tap deep moisture soil reserves. Too many repeated irrigation deficits will deplete the deep soil moisture reserve and lead to drought stress and poor tree vigor. Daily calculated ET_c are available through the CIMIS website (http://wwwcimis.water.ca.gov/cimis/welcome.jsp) Historical ET_c rates can also be used to help calculate a water budget. Average ET_c values for almond and walnut are on pages 5 and 6 of http://gwpa.uckac.edu/pdf/Estimating_Crop_Water_Use.pdf.

Irrigation System Efficiencies. Almond, Walnut, and Pistachio trees use 39, 42, and 41 inches of water annually, respectively. Inefficiencies within the differing irrigation systems affect the amount of water that is delivered into the soil profile. Sub-surface drip irrigation is the most efficient in water usage (95-98% efficiency), followed by micro sprinklers (85-95%), solid-set sprinklers (75-85%), and then furrow and flood irrigation (60-75%). Therefore, system inefficiencies must be taken in consideration when irrigating. For example, a three inch irrigation through a micro-sprinkler system only delivers 2.55-2.85 inches of water to the tree. Losses occur through evaporation, leaks within the system, clogged pipes, and dysfunctional sprinkler heads. Furthermore, irrigating on windy days will lose more water to evaporation – especially in microsprinkler and sprinkler irrigation systems.

Soil Water Holding Capacity. Depending upon texture, soils may hold more or less water per foot of soil. Broadly, Sandy soils hold the least amount of water per foot of soil (0.5-0.7"), followed by loamy sand (0.7-1.1"), sandy loams(0.8-1.4"), loams (1.0-1.8), silt loams(1.2-1.8"), clay loams (1.3-2.1"), and clay soils (1.4-2.4"). Applying too much water to coarse soils may lead to water percolation beyond the tree's root zone. Therefore, irrigations should never exceed the amount of water that is held in five feet of the soil profile. For example: an irrigation set of four applied acre inches on sandy soil moves water out of the rooting zone as only 2.5"-3.5" of water can be held in the first five feet of the rooting zone. Over application of water can be used to leach salts from the rooting zone, but this practice is not advised when water is of limited supply. Orchards on coarser soils may need to irrigate less water more frequently to ensure that water is within reach of the tree's roots.

Timing of irrigations. The first irrigation of the growing season is the most difficult to determine. Overwatering during this period has caused tree and yield loss due to an increased incidence of Phytophthora root and crown rot and Lower Limb Dieback. By using a pressure chamber, the tree's "pull" of water from the soil can be measured. The first irrigation should occur when the tree begins to "pull" water. This is determined by a pressure chamber reading more negative than the fully irrigated baseline of -6 bars in almond and -2 bars in walnut.

Subsequent irrigations are determined by using ET_c calculations, soil measurements, and/or pressure chamber readings. Irrigations should occur when the tree uses around 50-60% of the water within the effective rooting depth. Assuming a uniform, well-drained soil, the effective rooting depth is estimated between 4-5 feet for almond, 4-6 feet for walnut, and greater than 6 feet for pistachio. Constraints such as hardpans and soil texture changes may limit the depth of the tree roots. Proper pre-plant soil modification is needed to prevent this occurrence. Use of a soil auger or backhoe can determine if soil stratification occurs within the field.

Improving Soil Water Penetration. Orchard management practices should include methods of improving soil water penetration and holding capacity. Soil types vary in physical aspects that aid or prevent water penetration. Problems with water penetrations are often experienced with finer texture soils because the soil often "seals" up and prevents the flow of water into the soil. This may be observed about a day after irrigation when the first six inches to one foot of the soil is water saturated and the deeper soil is dry. Calcium (gypsum) can be used to improve water penetration. Being a positively charged ion, it binds to the soil to keep the soil from binding to itself, providing pores for the water to move through. Amendments of calcium are not always needed to improve water penetration.

The addition of organic matter has been demonstrated to increase the water penetration rate in annual crops. Organic material increases water penetration through two ways; large objects such as plant parts and stems provide pores for the water to enter the soil, while the breakdown of organic material results in the formation of positively charged acids (humic and fulvic acids) which bind to the soil in ways similar to calcium. Soils with high levels of organic matter have also been shown to have a higher water holding capacity. In this case, the organic matter acts similar to a sponge, holding more water within the rooting profile of the plant. Within perennial cropping systems, it is thought that organic material provides similar benefits, but research has not been completed in these areas.

Soils with poor water infiltration rates need to be watered less more frequently. It is best to match the irrigation rate with the rate that the water infiltrates into the soil. Most soils can be irrigated between 2-4 inches. Few soils can handle irrigations larger than 4 inches.

As orchard systems continue to evolve and improve, it is important to keep in mind the above principles to increase the efficiency of water usage. Providing the right amount of water at the right time and ensuring the delivery of that water into the rooting profile is essential to maintain a healthy and productive orchard. Advancements in irrigation technology appear to be moving into systems that improve timing of water applications. Adoption of these technologies will be reliant upon the ability to efficiently provide trees with water at the prescribed times. If any questions should arise, do not hesitate to contact your local farm advisor.

Irrigation Management of Almond Trees with a Limited Water Supply

From the UC Drought Management Website (http://ucmanagedrought.ucdavis.edu/almonds.cfm)

For maximum growth, yield, crop quality and orchard longevity almonds trees should be supplied with water to meet their full water requirement. There are some disease concerns with hull rot under full water conditions which can be addressed with moderate water stress during hull split. If water availability is limited, growers can react by applying irrigation water when trees are most sensitive to stress and by taking measures to minimize water losses that occur during irrigation events. Supplying less water than the trees can potentially use reduces soil water availability, causes tree water deficits, and reduces transpiration. Cover crops, depending on the coverage and the time of the season in which they are grown can increase the orchard water use by up to 30%. Cover crops should be removed when water is in limited supply.

Water deficits affect almond orchards not only in the year in which stress occurs, but also in the following seasons. Generally, nut size is reduced in the first season of significant water stress. Because water stress also reduces vegetative growth and potentially decreases productivity per unit canopy volume, nut load can be reduced in subsequent years. Recent research indicates some stages of almond fruit growth are more sensitive to water stress than others. Understanding these stages permits growers to withhold water while minimizing damage to trees and to current and subsequent crops.

Early season stress. Water stress affects more tree and crop development processes during the early season - from leaf out through shoot growth and development of terminal and lateral buds. During this period, rapid vegetative development is necessary for canopy development and fruiting positions for the following season. In addition, orchard water use during this time is low compared to summer demand, reducing potential water savings from an early-season deficit irrigation strategy.

Fruit growth and development. Nuts undergo a rapid growth phase early in the fruit growth and development period and are sensitive to water deficits during this time. However, trees can tolerate drought stress fairly well during the two months prior to harvest, allowing for the successful use of deficit irrigation strategies during this period. Providing less than the full water requirement to cause moderate water stress during this period, will have little influence on kernel weight. However, severe water stress in the months leading up to hull split will reduce kernel weight and significantly reduce hull spliting. A one-inch irrigation prior to hull split will mitigate the water stress impacts and will improve hull split and reduce the number of hull-tights. If drip irrigation is used, possibly less irrigation can provide the same benefit, but this has not been proven in the field.

Post harvest stress. The effect of water deficits during the postharvest period are substantially affected by 1) pre harvest water deficits and 2) the quantity of water use over the remainder of the season. Bud differentiation can continue through mid-September. Moderate stress during this period will have little effect on subsequent year's nut numbers, but severe stress during bud differentiation has been found to dramatically reduce fruit set the following spring. In early harvest (early August) districts, particularly with early varieties, more of the high water use season remains after harvest. This increases the necessity for postharvest irrigation. Later harvest (north State) districts and later varieties have a slightly shorter postharvest period which occurs at a time of lower crop water demand. These factors reduce the chance of moderate water deficits causing bud differentiation problems.

Tree response to postharvest stress can be influenced by the type of irrigation system used, and the previous irrigation management. Low volume systems with limited soil water reserves can result in severe water deficits very quickly after irrigation cut off. In the southern San Joaquin Valley where harvest is earlier than in the north, or with drought-sensitive varieties, postharvest irrigation is a necessity. Deep rooted, surface irrigated trees may have enough pre-harvest deep moisture remaining to carry them through the critical period of bud differentiation. This all depends on the irrigation management occurring pre-harvest.

Developing a Deficit Irrigation Strategy

Crop Water Use. Almond water use begins when the leaves develop and shoot growth begins. Concurrent with canopy development, the climatic demand increases, driven by longer days and higher temperatures and low humidity as the season progresses. Both of these factors result in a seasonal water use starting at a low level, peaking in mid-season and falling as season ends. Sources of water available to trees include: soil-stored moisture (including frost protection water applications if the root zone is less than field capacity when applications are made), any in-season rainfall absorbed by the soil, and applied irrigation water. These all combine to determine the total seasonal water available to the orchard.

Mature conventionally spaced almond trees in the Southern Sacramento Valley can use about 41- 44 inches of water in an average year of unrestricted water use. High-density orchards, long pruned orchards, or those with a cover crop can have even higher use. Soil moisture monitoring demonstrations in more than 40 almond orchards in Kern County indicate that seasonal water use in the southern San Joaquin Valley may be as high as 50 - 54 inches. Figure 1 shows a typical water use pattern for fully irrigated and a deficit irrigation regime for almond in the Manteca area. The moderately deficit irrigated orchard used (in a combination of soil supplied and irrigation water) 28 inches of water or about 34 % less than the full potential orchard

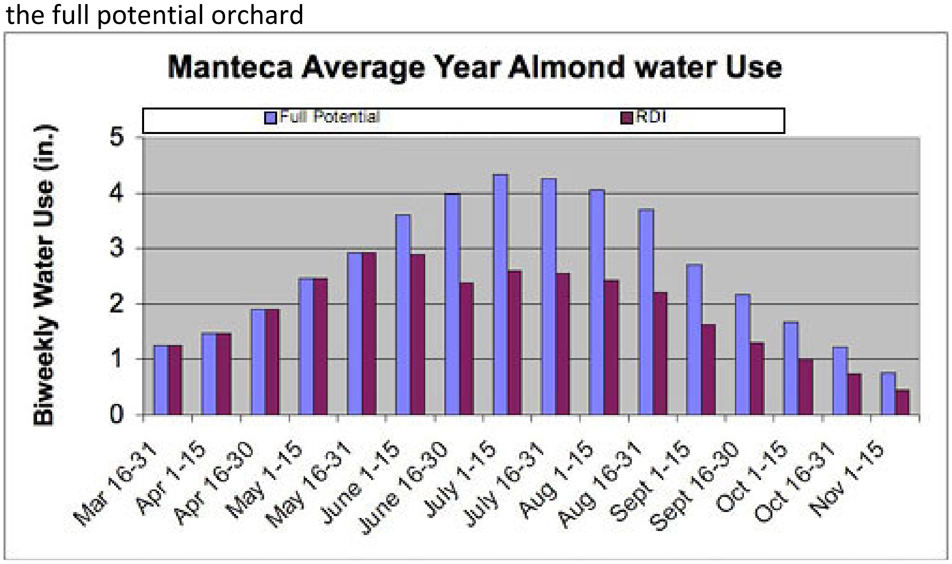


Figure 1: Seasonal water use for an almond orchard in Manteca, CA.

Water Deficits. Water deficits occur when the climatic water demand exceeds the water absorbed by the roots. As the soil becomes depleted of readily available moisture, water uptake by the roots lags behind tree water usage causing plant stress in the mid to late afternoon. This minor crop water deficit has little effect on the crop yield. However, as soil water becomes increasingly difficult to extract water stress increases. One way to measure "tree stress" is to use a portable pressure chamber to measure "midday stem water potential". To use this technique a few leaves from representative trees are first covered with an opaque plastic bag while still on the tree. The covers need to remain on the leaves at least 10 minutes after which they are detached and the water potential measured using the pressure chamber. The pressure chamber measures the amount of pressure needed to force water out of the leaf petiole, indicating trees water status.

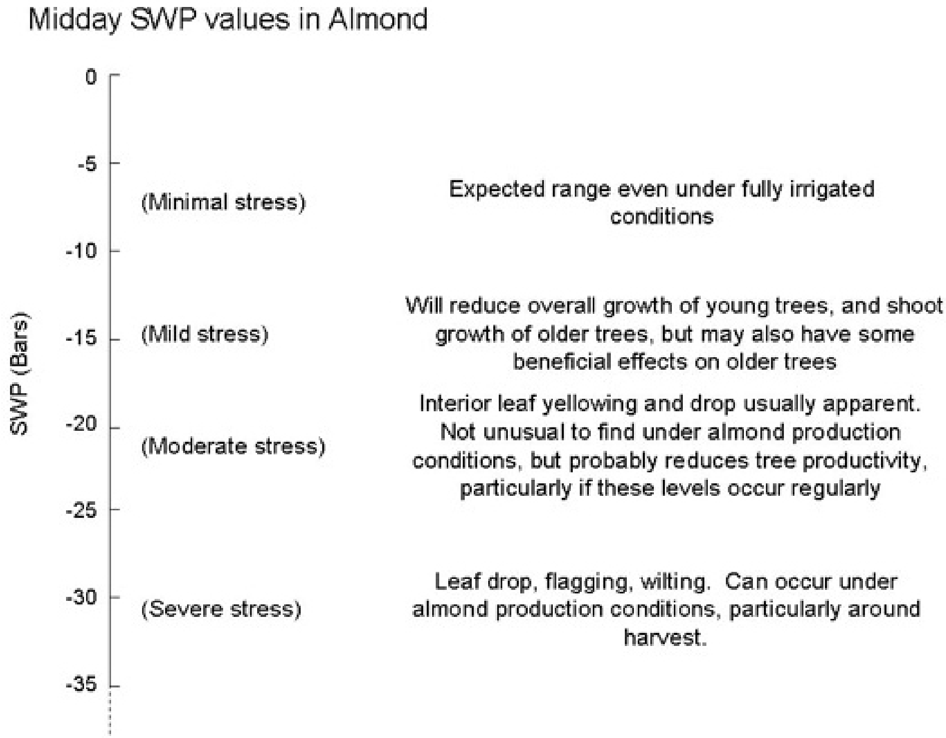
A Moderate Water Stress Strategy. From the previous discussion it can be concluded that tree water use from leaf out through mid June should not be compromised. From mid June through harvest, reductions up to 50% of full water use have been successfully used to reduce orchard water use with only minimal reductions in kernel weight. It is important to supply the trees with water near hull split to avoid hull-tights.

There are various approaches growers can take to manage limited water supplies depending on what types of irrigations scheduling tools interest or are available to them. A simple method is to reduce irrigation run time or lengthen irrigation intervals to obtain the desired percentage of irrigation reduction in applied water. In a four-year study investigating pre-harvest, post-harvest, and uniform deficit irrigation for the entire season, the best results were achieved when water applications occurred at a uniform deficit rate across the season relative to full potential crop ET. The uniform deficit rate does not mean a uniform irrigation amount across the season (e.g. 1.5 inches each week), but rather a uniform (e.g. 85%) reduction of full ET for each period. Deficit irrigation rates of 55%, 70%, and 85% were tested with the 70% and 85% irrigation reduction treatments showing little yield loss compared to the full ET treatment. The 70% and 85% uniform across the season deficit treatments experienced little early season stress, likely because stored soil moisture supplemented the applied irrigations.

Another approach that is likely an improvement over the approach outlined above is to schedule irrigations using periodic pressure chamber readings and irrigate when midday stem water potential reaches a pre-determined threshold stress level (see Figure below). This method effectively extends the irrigation interval, but the interval is determined by tree water status rather than the calendar. Irrigations should be in the volume of a normal set as performed with a full irrigation regime. In a deficit irrigation study conducted on mature almond in the Manteca, CA a just prior to irrigation threshold value of -20 to -22 bars midday stem water potential beginning in June resulted in 34% less tree water consumption and no significant influence on yield for the 4-year measurement period. It should be noted that a reduction in vegetative growth was measured in this treatment, indicating that use of this threshold for a longer-term strategy (more than 4 years) may reduce yields by reducing nut numbers. The impacts of stress on a developing tree canopy is much more detrimental as opposed to the impacts on a canopy that has already reached its full volume.

A More Severe Water Stress Strategy. A more severe strategy that reduces seasonal tree water use by 50% requires that stress be imposed early as well as mid to late season. Using this strategy, irrigations in April and May are withheld until trees reach a midday stem water potential of -12 to -14 bars. Using conventional sprinklers, a normal set time is used. If lighter applications are made, more water is lost by evaporation. From June 1st through hull split, midday stem water potential values should be allowed to reach -20 to -22 bars just prior to irrigation. This strategy will require a pre-harvest irrigation of about 2 inches with sprinklers-less with micros and drip--to ensure good hull split. Note: this strategy reduces water use significantly but also reduces nut weight the year it is used and the nut number in succeeding years. In the Manteca trial discussed above, it took 2 years of full irrigation for trees to recover.

A "Staying Alive" Drought Strategy. Less is known about this strategy since it is a rarely used option. However, based on past drought conditions, trees may be kept alive with about a foot of applied water. This strategy does not consider growth and yield-just tree survival. This strategy is best conducted using a micro-irrigation system which maximizes water distribution and minimizes evaporative losses from irrigation. Using this strategy no irrigation is applied until water potential reaches -16 bars from leaf out through the end of May. Monitor stem water potential until the threshold is reached again then repeat the cycle. After June 1st, and for the rest of the season allow the stress to climb to -25 bars prior to irrigation. As a guide, try to just retain the leaves on the tree. Good luck, as this is only a guide. Remember that following this severe deficit strategy, it will take at least 2 years of full irrigation for the trees to recover to normal yields.



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Severe Drought Management Recommendations for Almond

David Doll, Farm Advisor UCCE Merced

UC researchers have urged growers not to take aggressive actions in reducing tree size or crop load in response to the West side water shortages this year. Severe pruning will increase new growth which would increase the leaf surface and evapo-transpiration rates (ET) of the tree. Crop thinning has a similar effect and is also not recommended. By reducing crop load, the source/sink ratio of the tree is disturbed, causing the tree to put nutrients into vegetative growth instead of the nuts. Furthermore, data suggests that less than 10% of ET may be attributed to crop load. The tree should thin naturally when it undergoes a late-spring water stress period. Furthermore, in season nitrogen applications should also be reduced in order to reduce vigorous shoot growth.

In scheduling irrigation, the pressure chamber should be used to determine the stem water potential of the trees. Orchard irrigations should not be initiated until the trees reach -15 bars. Irrigations should be at the percentage of ET that can be afforded - for example: if 15% of water available for the season, water at 15% ET at each irrigation. Research by David Goldhamer suggests that almond trees can survive through the year on as little as 6-8 inches of water (5- 10% ET). This includes the 2-4 inches of water available within the soil profile.

Further reduction of inputs this coming year is advised for the West side growers facing water restrictions. Reductions of in-season fertilizers and foliar nutrients will help decrease the vigor of the tree. Use judgment in making these cutbacks as the goal is to reduce tree vigor, not to make the trees deficient. Post harvest fertilizer applications are still recommended. Furthermore, it is not advised to cut back on miticides. With severely stressed trees, mites can flare up easily, causing defoliation and adding to tree stress. If the orchard has a history of pyrethroid use, miticides will most likely be necessary for the coming growing season. If softer chemistries have been used, sprays may be limited or unnecessary. In these cases, monitoring the population of mites and beneficials will be needed throughout the season to see if they approach the treatment threshold.

A light pruning or topping, may be a feasible practice to stop new shoot growth in the spring. Once the trees push new growth, heading cuts would terminate shoot growth, thus reducing leaf surface area. This may work if nitrogen rates were reduced - otherwise the tree would push again causing more tree stress. There is no direct data that supports this practice, and it may not be worth the effort or expense.

In general, if the tree is able to maintain some of its leaves until the fall, the tree probably will survive. Yields will be affected severely for the next 2-3 years. This year would be a good year to remove older blocks with declining production and divert the water to younger blocks if possible.

A meeting on drought irrigation management will be held at 7:30AM - 12:30PM on March 31st at Panoche Creek Packing in Kerman, CA (1221 South Madera Avenue). David Goldhamer and several other researchers will be presenting on the water issues facing growers in 2009.

Regional Peach IPM Project

Maxwell Norton, UC Cooperative Extension, Merced County

Beginning this month, we will be starting a regional Integrated Pest Management implementation project. Our objective is to work with commercial peach growers on improving the effectiveness of their pest management programs and also increase the use of biological control and other “soft” technologies. This will involve intensive monitoring of each participating block. We will initially be working with late varieties. Mating disruption and releasing parasitic wasps to control oriental fruit moth will be compared to other programs.

If you are interested in this project contact Maxwell Norton 209-385-7403. I may be setting up a weekly or bi-weekly e-mail list to let everyone know what we are finding while still respecting the privacy of the individual growers. If you are interested in that, let me know also. My e-mail is mnorton@ucdavis.edu (please do not put me on any lists or starte-mailing me unsolicited articles, papers or jokes).

Frost Preparation & Winter Injury

Maxwell Norton, UC Cooperative Extension, Merced County

Over the years I have seen the difference that preparation makes in frost protection. I have observed how one vineyard that had bare soil under the vines and the cover crop in the middles mowed very low had no frost damage while another vineyard nearby with poor preparation had severe damage. Having bare soil under the vines requires efforts back in the fall with the application of pre-emergent herbicides to prevent weeds from growing during the winter. Mowing the middles needs to be done enough in advance, and often enough to prevent a thick layer of residue on the ground that will insulate it from solar radiation.

You have read this before: bare, moist, firm soil is the warmest condition. Coldest conditions are dry fluffy soil or tall cover crops. Closely mowed cover (with out a thick layer of recently mowed material) is a good compromise.
Check out frost protection systems now while you have lots of time to do repairs (or lower a well intake). Some growers have turned on wells to apply a winter irrigation because of the dry root zone. This was an opportunity to a test run for frost protection.

A note about winter injury to grapes:

Steve Vasquez, in our Fresno office has observed crown gall infestations in some vineyards. These infections often follow very cold winter temperatures and dry soil conditions – especially from the 06-07 winter. Remember the frozen swimming pools? Fortunately, in our hot, dry conditions, crown gals in grapes, seldom causes lasting injury. This is not the case with Walnuts where severe infestations can cause tree stunting or even death. The crown gall bacteria remains inside the grape vine and can express itself again later. On rare occasions we may see an infection that becomes severe enough to disrupt the vascular system and stunt the vine.

Oil Burn in Prunes

Franz Niederholzer, UC Farm Advisor, Sutter/Yuba Counties

Young "red" wood or shoots are most sensitive to damage from dormant oil sprays. Oil burn can severely damage prune trees and can kill young prune trees in extreme cases. Exactly how oil damages wood in dormant prunes is not clearly known. What can be done to avoid oil burn in 2009?

1) Use no oil or a very low oil rate of oil. Oil is not needed for excellent aphid or peach twig borer control. Oil is a very important material for scale control -- with or without synthetic pesticide such as diazinon, Lorsban, Seize WP, etc.. Take a dormant spur sample to find out if you have a scale problem. Many prune blocks will not need scale control.

2) Wait until just before bloom to spray for dormant pests. The closer to bloom, the smaller the chance of oil burn. Delayed dormant is a much safer timing than dormant for using oil in prunes. Note: Certain pesticides are very toxic to bees. If spraying pesticides just prior to prune bloom, make sure to follow all guidelines to protect bee health. Contact your local County Ag Commissioner's office to determine local bee safety regulations. No bees = no prunes.

3) Irrigate your orchard before spraying. Dry soil is very strongly related to oil damage in prunes.

4) Wait until tree bark is moist (wet conditions). I have seen significant oil damage when trees on wet ground are sprayed on the first calm day after several days of dry north winds. Once rain or fog rewets trees, the risk of oil damage is greatly reduced. Be sure you understand what can lead to oil damage and know what conditions are like in your field. Don't take chances. Oil can damage or kill several years of growth.

<u>High Risk of Oil Burn</u>	<u>Low Risk of Oil Burn</u>
Young Trees	Old Trees
Dry Conditions[1]	Wet Conditions[2]
Dry soil	Good Soil Moisture
High rate of oil	Moderate Rates of Oil
Early Dormancy	Delayed Dormancy
Air application	Ground Application
Poor agitation	Good Agitation
Moyer prunes	

[1] Example: The first clear, calm day after a dry north wind blows for 1-3 days
[2] Example: Immediately after a rain or after morning fog

Free On-lin:
#21638 Bird Hazing Manual
http://anrcatalog.ucdavis.edu/Items/21638.aspx
Updated Pest Management Guideline
#3456 Pecan
http://anrcatalog.ucdavis.edu/PestManagementGuidelines/3456.aspx
Songbird, Bat and Owl Boxes
#21636 $15.00 - at your local Cooperative Extension office

Drought Irrigation Management for Almond

Tuesday, March 31, 2009, 7:30 AM-12:30 PM
Panoche Creek Packing
1221 South Madera Avenue, Kerman CA 93630

7:30 a.m.	**Sign up and refreshments, moderators and meeting organizers** *Brent Holtz, David Doll, and Bob Beede, UCCE Farm Advisors*
8:00 a.m.	**Fine tuning your micro-irrigation system** *Dr. Larry Schwankl, Irrigation Specialist, UC Davis*
8:30 a.m.	**Water relations, water requirements, and irrigation scheduling** *Dr. David Goldhamer, Irrigation Specialist, UC Davis*
9:15 a.m.	**Drought strategies: how to best manage a limited water supply and impact on current and future production** *Dr. David Goldhamer, Irrigation Specialist, UC Davis*
10:00 a.m.	**Irrigation questions and discussion with Dr. Goldhamer**
10:15 a.m.	**Break**
10:30 a.m.	**Kaolin-processed clay on almond bud failure and yield** *Dr. Brent Holtz, Farm Advisor, UCCE Madera County*
11:00 a.m.	**Use of reflective particle films to increase water use efficiency** *Dr. Michael Glenn, USDA-ARS-Kearneysville, West Virginia*
11:30 a.m.	**Irrigating almonds with groundwater** *Daniel Munk, Farm Advisor, UCCE Fresno County*
12:00 p.m.	**Acute drought impacts on groundwater basins** *Dr. Thomas Harter, Water Management and Policy, UC Davis*
12:30 p.m.	**Free Lunch**

Sponsors for a free lunch: Panoche Creek Packing, Superior Almond Hulling, Western Ag Chipping, Agri Valley Irrigation, The Gowan Co., Midland Tractor, American West and West Valley Aviation, Britz Simplot Grower Solutions, Tessenderlo Kerley, University of California, and the Almond Board of CA

Please RSVP Kristi at Panoche Creek for lunch by March 27, at 559-449-1721 or fax 559-435-3481